

# इंटरनेट

# मानक

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IS 7587-4 (2006): Cage suspension gear for winding in mines, Part 4: Bridle chains [MED 8: Mining Techniques and Equipment]



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भारतीय मानक

खानों में वाईंडिंग के लिए केज सस्पेंशन गियर — विशिष्टि

भाग 4 ब्राइडल चेन

( पहला पुनरीक्षण )

*Indian Standard*

CAGE SUSPENSION GEAR FOR WINDING  
IN MINES — SPECIFICATION

PART 4 BRIDLE CHAINS

( *First Revision* )

ICS 73.100.40

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**BUREAU OF INDIAN STANDARDS**  
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NEW DELHI 110002

## FOREWORD

This Indian Standard (Part 4) (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Mining Techniques and Equipment Sectional Committee had been approved by the Mechanical Engineering Division Council.

This standard was first published in 1975. The experience gained in implementation of the standard has necessitated this revision.

Bridle chains is a component of the cage suspension gear, which is exclusively employed in shafts for attachment of the cage or other form of conveyance to the other parts of the cage suspension gear.

In this revision, the following important changes are made:

- a) Bridle chains links of sizes 16 mm, 20 mm, 22 mm and 25 mm corresponding to cage suspension gear of capacity 50, 80, 100 and 120kN respectively are only being used in winding. Accordingly, links of other sizes have been deleted.
- b) Bridle chains made out of steel of grade 20Mn2 are found to have not been giving adequate factor of safety. Accordingly, use of 20 Mn2 steel has been deleted.

This standard is issued in eight parts. The other parts in this series are:

Part 1 General requirements

Part 2 Cappings

Part 3 Shackles and pins

Part 5 Distribution plates

Part 6 Safety detaching hooks (4 plate type) 80 and 100 kN capacity

Part 7 Safety detaching hooks (4 plate type) 120, 150 and 200 kN capacity

Part 8 Clivey hook suspension arrangements

The Committee responsible for the formulation of this standard is given at Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

# *Indian Standard*

## CAGE SUSPENSION GEAR FOR WINDING IN MINES — SPECIFICATION

### PART 4 BRIDLE CHAINS

( *First Revision* )

#### 1 SCOPE

This standard (Part 4) covers the requirements for bridle chains consisting of short, intermediate and end links for use as sling legs for suspension of cages.

#### 2 REFERENCES

The following standards contain provisions, which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

<i>IS No.</i>	<i>Title</i>
4432:1988	Case hardening steels ( <i>first revision</i> )
5616:1982	Short link chain for lifting purposes — General condition of acceptance ( <i>first revision</i> )
7587 (Part 1) : 2004	Cage suspension gear for winding in mines: Part 1 General requirements ( <i>first revision</i> )

#### 3 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply.

##### 3.1 Short Links

These links are used to form the main part of the bridle chain at the ends of which intermediate and end links are connected.

##### 3.2 Intermediate Links

These links are connected at the ends of the short link chain to connect the chain to an end link to form a leg of a set of bridle chains.

##### 3.3 End Links

These links are connected to intermediate link at either end of chain leg and in suspension connected to a shackle.

#### 4 GENERAL REQUIREMENTS

##### 4.1 Material

The steel used for manufacturing of bridle chain shall conform to designation 20Ni2Cr2Mo2 of IS 4432.

4.2 The bridle chains shall comply in all other respects with the requirements laid down in IS 7587(Part 1).

4.3 When safety chains are required their length shall be one short link longer than the actual length required to take the load.

4.4 Equivalent elongation at fracture of 1m length of chain shall not be less than 150 mm.

#### 5 DESIGN

In a four leg chain assembly each chain is connected to cage hangers at the four corners of the cage and each chain is equally loaded. The actual static load in each of the four corner bridle chains upon which the cage is suspended (*see* Fig. 1) shall be determined by the following formula:

$$P = (5W/2h) \times \sqrt{(a^2 + b^2 + h^2)}$$

where

$P$  = corner chains static load, in kN;

$W$  = total static load of loaded cage and chains, etc, in kN;

$h$  = vertical height between the centres of the upper and lower shackle pins, in mm;

$a$  = horizontal distance from the centre of the upper shackle pin normal to the line joining the centres of the lower shackle pin at the end of the cage, in mm; and

$b$  = half the distance between the centres of the lower shackle pins at the end of cage, in mm.

#### 6 DIMENSIONS

6.1 The dimensions of the short link, intermediate link and end link shall be as given in Tables 1, 2 and 3 respectively.

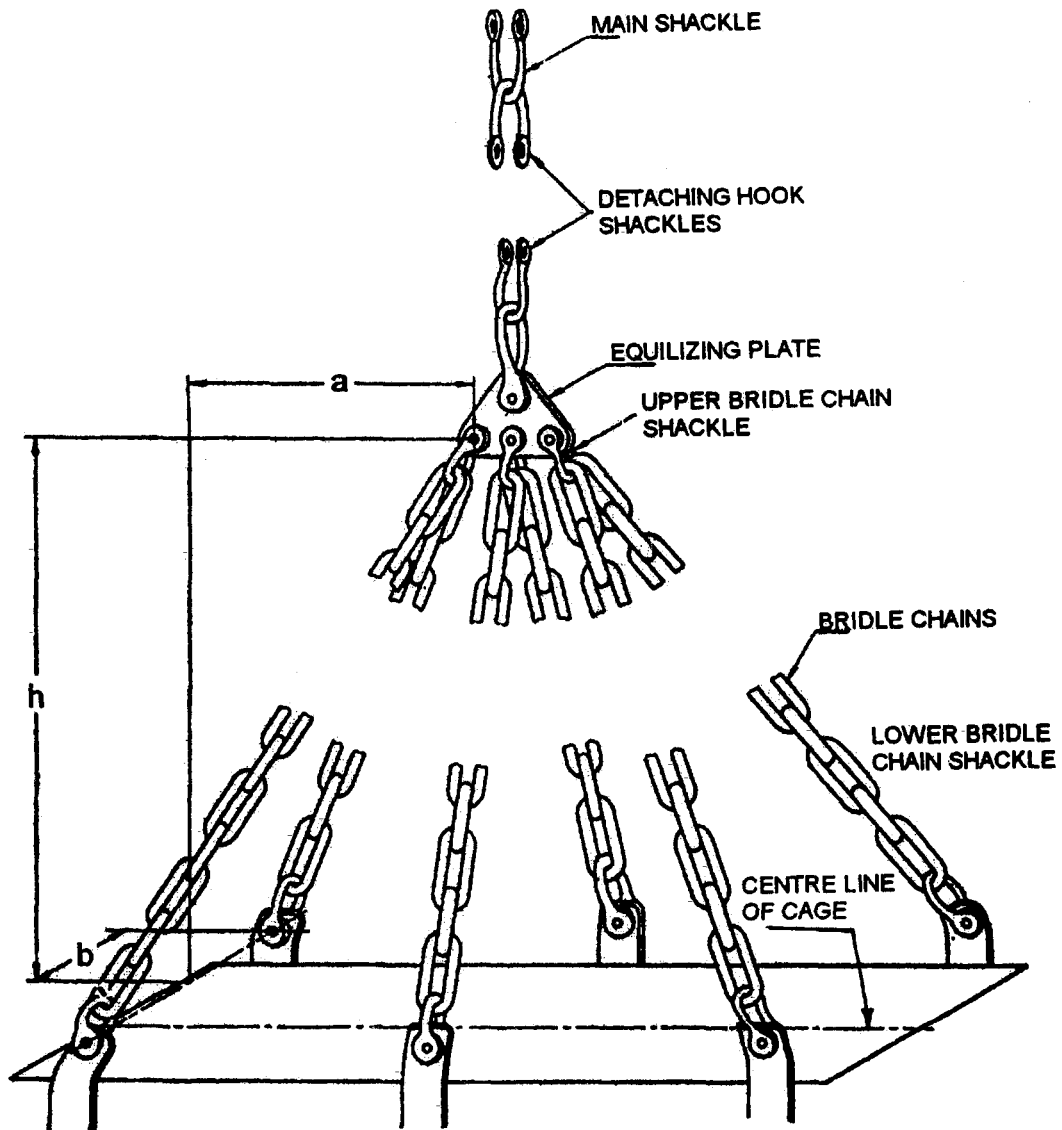


FIG. 1 BRIDLE CHAIN ASSEMBLY

## 6.2 Area Affected Dimensionally by Welding

The weld or welds shall be positioned in the centre of one or both legs of the link. The area affected dimensionally by welding shall not extend by more than 0.6 times the material diameter (nominal size) to either side of the joint.

## 7 TOLERANCES

### 7.1 Length of Chains

The effective length of the individual chain in a set of bridle chains shall be equal as nearly as possible. The difference in length shall be either 0.25 percent of the effective length or 6 mm, whichever is less.

### 7.2 Nominal Size (Material Diameter) of the Link

#### 7.2.1 Adjacent to the Weld

For size 16 mm the diameter of the material in

the finished link shall nowhere differ from the nominal size by more than  $\pm 6$  percent except at the weld. For sizes 18 mm and above, the material diameter in the finished link shall nowhere differ from the nominal size by more than  $\pm 5$  percent except at the weld.

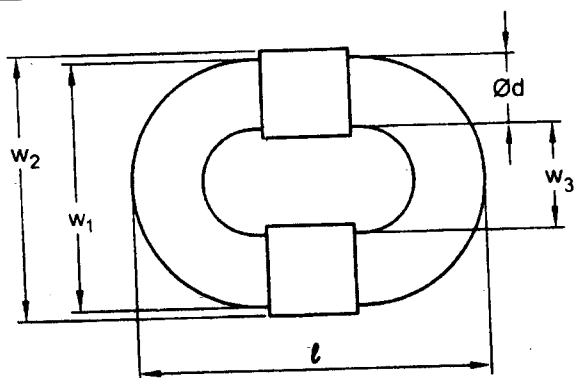
#### 7.2.2 At the Weld

The material diameter, at the weld shall nowhere be less than the material diameter adjacent to the weld or exceed it by more than the following:

- Asymmetric welded chain* — 20 percent in the direction normal to the plane of the link and 35 percent in any other direction; and
- Smooth welded chain* — 8 percent in any direction.

Table 1 Dimension for Short Links

(Clause 6.1)

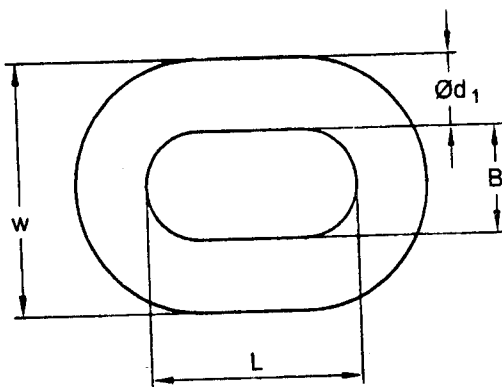


Sl No.	Nominal Size $d^{1)}$	Length $l$		Outside Width		Inside Width Adjacent to Weld $w_3$ Min $(1.25d)$
		Max $(5d)$	Min $(4.75d)$	Adjacent to Weld $w_1$ Max $(3.5d)$	At Weld $w_2$ Max $(1.05w_1)$	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	16	80	76.0	56	58.8	20.0
ii)	20	100	95.0	70	73.5	25.0
iii)	22	110	104.5	77	80.8	27.5
iv)	25	125	118.8	87.5	91.6	31.2

<sup>1)</sup> Nominal size (material diameter) shall be measured in accordance with IS 5616.

Table 2 Dimensions for Intermediate Links

(Clause 6.1)

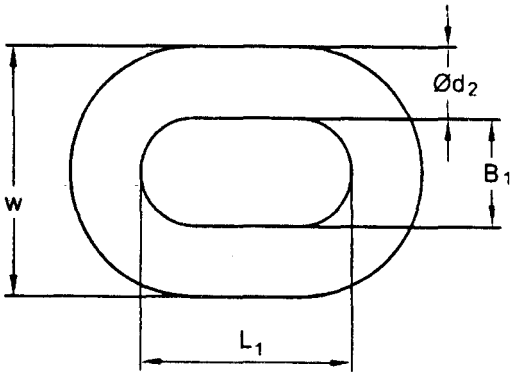


Sl No.	Nominal Size of Short Link $d$	Material Diameter for Intermediate Link $d_1^{1)}$ $(1.18d)$	Internal Width, $B$ Min $(2d)$	Internal Length ( $L$ )	
				Min $(3.5d)$	Max $(4.25d)$
(1)	(2)	(3)	(4)	(5)	(6)
i)	16	18.9	32	56.0	68
ii)	20	23.6	40	70.0	85.0
iii)	22	26.0	44	77.0	93.5
iv)	25	29.5	50	87.5	106.2

<sup>1)</sup> Material diameter shall be measured in accordance with IS 5616.



Table 3 Dimensions for End Links  
(Clause 6.1)



Sl No.	Nominal Size of Short Link <i>d</i>	Material Diameter for End Link <i>d<sub>2</sub><sup>1)</sup></i> (1.6 <i>d</i> )	Internal Width, <i>B<sub>1</sub></i>		Internal Length ( <i>L<sub>i</sub></i> )	
			Min (3 <i>d</i> )	Max (3.5 <i>d</i> )	Min (5 <i>d</i> )	Max (7 <i>d</i> )
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	16	25.6	48	56.0	80	112
ii)	20	32.0	60	70.0	100	140
iii)	22	35.2	66	77.0	110	154
iv)	25	40.0	75	87.5	125	175

<sup>1)</sup> Material diameter shall be measured in accordance with IS 5616.

8 ANGULARITY

The angularity between two diagonal chains shall preferably not exceed 60°.

9 DESIGNATION

A bridle shall be designated by the commonly used name, nominal size and IS number.

*Example:* A bridle chain of nominal size 25 mm shall be designated as follows:

Bridle Chain 25 IS 7587 (Part 4)

10 PROOF LOAD TEST

Each bridle chain shall be subjected to proof load test to the values specified in Table 4. The chain shall withstand the load without any permanent deformation or set.

11 MARKING

11.1 Identification Marking

Bridle chains shall be marked with the nominal size,

safe working load, abbreviated name for material and the manufacturer's identification mark.

11.2 The stamps used for marking shall be of following sizes:

Safe Working Load kN	Size of Mark mm
Up to 30	3
Over 30 and up to 50	5
Over 50	6

11.3 BIS Certification Marking

Each bridle chains may also be marked with the Standard Mark.

11.3.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

**Table 4 Test Requirement for Short Link Chain***(Clause 10)*

Sl No.	Nominal Size mm	Proof Load to Which the Whole Chain is Subjected kN	Minimum Breaking Load kN	Minimum Energy Absorption Factor kN.m	Maximum Safe Working Load kN	Lifting Capacity kN
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	16	121.0	242	44.6	24.2	24.20
ii)	20	184.0	368	69.8	36.8	36.78
iii)	22	228.0	456	84.4	45.6	45.59
iv)	25	296.0	592	109.6	59.2	59.15

**ANNEX A***(Foreword)***COMMITTEE COMPOSITION****Mining Techniques and Equipment Sectional Committee, ME 08**

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**Amendments Issued Since Publication**

Amend No.	Date of Issue	Text Affected

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